ESI EnviroSystems, Inc.
ENVIRONMENTAL TOXICOLOGICAL TESTING

EnviroSystems, Inc.
P.O. Box 778
Hampton, NH 03843-0778
603-926-3345

August 29, 2018

Mr. Chuck Come
Warner Village Water District
55 West Joppa Road
P.O. Box 252
Warner, New Hampshire 03278

Dear Mr. Come:

Enclosed, please find a copy of our report evaluating the toxicity of an effluent sample collected from the Warner Village, New Hampshire Wastewater Treatment Facility during July 2018. Acute toxicity was evaluated using the freshwater species, *Ceriodaphnia dubia* and *Pimephales promelas*.

Please do not hesitate to call me should you have any questions regarding the report.

Sincerely,

EnviroSystems, Incorporated

Lisa Francisco
Project Manager

Enclosure
WET Test Report Certification
Report Number 30901-18-07
One (1) Copy + email

WHOLE EFFLUENT TOXICITY TEST REPORT CERTIFICATION

Permittee Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Executed on: _____ _____

Authorized Signature

_____

Print or Type Name

The Warner Village Water District

Print or Type the Permittee's Name

NH0100498

Type or Print the NPDES Permit No.

WHOLE EFFLUENT TOXICITY TEST REPORT CERTIFICATION (Bioassay Laboratory)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Executed on: August 29, 2018 

Kirk Cram
Laboratory Director - EnviroSystems, Inc.

TOXICOLOGICAL EVALUATION
OF A TREATED MUNICIPAL EFFLUENT
BIOMONITORING SUPPORT FOR A NPDES PERMIT:
July 2018

Warner Village Wastewater Treatment Facility
Warner, New Hampshire
NPDES Permit Number NH0100498

Prepared For:

Warner Village Water District
55 West Joppa Road
P.O. Box 252
Warner, New Hampshire 03278

Prepared By:

EnviroSystems, Incorporated
One Lafayette Road
Hampton, New Hampshire 03842

July 2018
Reference Number: WarnerVillage30901-18-07

STUDY NUMBER 30901

EXECUTIVE SUMMARY

The following summarizes the results of 48 hour acute exposure bioassays performed during July 2018 to support the NPDES biomonitoring requirements of the Warner Village, New Hampshire Wastewater Treatment Facility. Acute assays were completed using the freshwater species, *Ceriodaphnia dubia* and *Pimephales promelas*.

C. dubia, cultured at ESI, were <24 hours old juveniles released within 8 hours of one another. *P. promelas*, supplied by Aquatic Research Organisms, Inc. of Hampton, NH, were 9 days old at the start of the test. Dilution water was receiving water collected from the Warner River upstream of the discharge. Samples were received under chain of custody in good order. All sample receipt, test conditions and control endpoints were within protocol specifications, except where otherwise noted.

The results presented in this report relate only to the samples described on the chain(s) of custody and sample receipt log(s), and are intended to be used only by the submitter. Results from the acute exposure assays and their relationship to permit limits are summarized in the following matrix.

Acute Toxicity Evaluation

Species	Exposure	LC-50	A-NOEC	Permit Limit (LC-50)	Effluent Meets Permit Limit	Assay Meets Protocol Limits
Ceriodaphnia dubia	48 Hours	>100%	NC	100%	Yes	Yes
Pimephales promelas	48 Hours	>100%	NC	100%	Yes	Yes

COMMENTS:
NC = Not Calculated.

TOXICOLOGICAL EVALUATION
OF A TREATED MUNICIPAL EFFLUENT
BIOMONITORING SUPPORT FOR A NPDES PERMIT:
July 2018

Warner Village Wastewater Treatment Facility
Warner, New Hampshire
NPDES Permit Number NH0100498

1.0 INTRODUCTION

This report presents the results of toxicity tests completed on a composite effluent sample collected from the Warner Village, New Hampshire Wastewater Treatment Facility (Warner Village WWTF). Testing was based on programs and protocols developed by the US EPA (2002), with exceptions as noted by US EPA Region I (2011), and involved conducting 48 hour acute toxicity tests with the freshwater species, *Ceriodaphnia dubia* and *Pimephales promelas*. Testing was performed at EnviroSystems, Incorporated (ESI), Hampton, New Hampshire in accordance with the provisions of TNI Standards (2009).

Acute toxicity tests involve preparing a series of concentrations by diluting effluent with control water. Groups of test animals are exposed to each concentration and a control for a specified period. In acute tests, mortality data for each concentration are used to calculate the median lethal concentration, or LC-50, defined as the effluent concentration that kills half of the test animals. Samples with high LC-50 values are less likely to cause significant environmental impacts. The acute no observed effect concentration (A-NOEC) provides information on the effluent concentration having minimal acute effects in the environment and is defined as the highest tested effluent concentration that causes no significant mortality.

2.0 MATERIALS AND METHODS

2.1 General Methods

Toxicological and analytical protocols used in this program follow procedures primarily designed to provide standard approaches for the evaluation of toxicological effects of discharges on aquatic organisms (US EPA 2002), and for the analysis of water samples (APHA 2012). See Section 4.0 for a list of references.

2.2 Test Species

C. dubia were maintained in laboratory water at 25±1°C with a photoperiod of 16:8 hours light:dark. Cultures are fed daily with a yeast/trout chow/Cerophyll or alfalfa leaves (YTC) mixture supplemented with *Pseudokirchneriella subcapitata* (algae) (US EPA 2002). Adults on a brood board were isolated 24 hours prior to test start and allowed to reproduce for 8 hours.

P. promelas were acclimated to approximate test conditions prior to use in the assay. Organisms were transferred to test chambers using an inverted glass pipet, minimizing the amount of water added to test solutions. Cultures were fed newly hatched *Artemia* nauplii until test start. Twenty control fish were weighed during the test to confirm loading rates. The loading rate was below the maximum 0.4 g/L recommended for assays conducted at 25°C. Fish weights and loading calculations are included in the data appendix.

2.3 Effluent, Receiving Water and Laboratory Water

Effluent and receiving water collection information is provided in Table 1. Samples were received at 0-6°C as per 40 CFR §136.3 unless otherwise noted, stored at 4±2°C and warmed to 25±1°C prior to preparing test solutions. Laboratory water was synthetic reconstituted water prepared at ESI according to protocol (US EPA 2002). This water has been used to successfully culture freshwater organisms since 1992.

Total residual chlorine (TRC) was measured by amperometric titration (MDL 0.02 mg/L) in the effluent samples prior to use in the assays. Samples with ≥0.02 mg/L TRC were dechlorinated using sodium thiosulfate (US EPA 2002) and a control treatment using laboratory water adjusted with the same amount of sodium thiosulfate used to dechlorinate the effluent was run concurrently with the assay. If sample pH measured <6.0 SU or >9.0 SU, samples were adjusted using sodium hydroxide or hydrochloric acid,

respectively, and a control treatment using laboratory water adjusted with the same amount of either compound used to modify sample pH was run concurrently with the assay. When applicable, data from sodium thiosulfate and/or pH adjusted laboratory control treatments can be found in Appendix A.

2.4 Acute Exposure Bioassays

The 48 hour static acute assays were conducted at 25±1°C with a photoperiod of 16:8 hours light:dark. Test concentrations were 100% (undiluted), 50%, 25%, 12.5%, and 6.25% effluent. Daphnids were maintained in 30 mL test chambers with approximately 25 mL of test solution in each of 4 replicates with 5 organisms/replicate. Replicates in the *C. dubia* assay were not randomized; rather, test organisms were derived from a pool of mixed organisms recovered from ESI's culture the morning of testing. All organisms used were recovered from the same type of culture water. Minnows were maintained in 250 mL glass beakers with 200 mL of test solution in each of 2 replicates with 10 organisms/replicate. Replicates were not randomized during testing; rather, organisms were added randomly at test initiation by replicate across test solutions in an alternating fashion (alternating allocation).

Survival was recorded daily in all test replicates of both assays. A fifth replicate in the daphnid assay was included as a surrogate test chamber to obtain daily water qualities without disturbing the test animals, and was treated the same as actual test chambers with the addition of animals and food, but was not used to determine endpoint data. Dissolved oxygen and pH were measured daily, and specific conductivity was measured at the start of the daphnid assay. Dissolved oxygen was measured daily in all replicates and pH was measured daily in one replicate of each minnow test treatment; temperature was measured daily in one replicate of the laboratory water control. Specific conductivity was measured in one replicate of each test concentration at the start of the minnow assay.

2.5 Data Analysis

Data analysis involved, as required, determination of LC-50 values using CETIS™ v1.9.3.0, Comprehensive Environmental Toxicity Information System, software. The program computes LC-50 values using the Spearman-Karber and Probit methods following protocol guidelines. If survival in the highest test concentration was >50%, LC-50 values were obtained by direct observation of the raw data. As needed, the A-NOEC was determined as the highest test concentration that caused no significant mortality.

2.6 Quality Control

As part of the laboratory quality control program, reference toxicant evaluations are completed on a regular basis for each test species. These results provide relative health and response data and allow for comparison with historic data sets. See Table 2 for details.

3.0 RESULTS AND DISCUSSION

Results of the acute toxicity tests completed using *C. dubia* and *P. promelas* are summarized in Table 3. Table 4 contains effluent and diluent characteristics. US EPA Region I Attachment F toxicity test summary sheets are included after the tables. Support data, including copies of laboratory bench sheets, are provided in Appendix A.

Minimum test acceptability criteria require ≥90% survival in the control concentrations. Achievement of these results indicates that healthy test organisms were used and that the dilution water had no significant adverse impact on the outcome of the assay. See the Executive Summary and Table 3 for test acceptability.

4.0 LITERATURE CITED

40 CFR §136.3. *Code of Federal Regulations* (CFR), Protection of the Environment (Title 40), Guidelines Establishing Test Procedures for the Analysis of Pollutants (Part 136), Identification of Test Procedures (sub-part 3), Table II-Required Containers, Preservation Techniques, and Holding Times.

APHA. 2012. *Standard Methods for the Examination of Water and Wastewater*, 22nd Edition. Washington D.C.

The NELAC Institute (TNI). 2009. *Environmental Laboratory Sector, Volume 1: Management and Technical Requirements for Laboratories Performing Environmental Analysis (TNI Standard)*. EL-V1-2009.

US EPA. 2002. *Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms*. Fifth Edition. EPA-821-R-02-012.

US EPA Region I. 2011. *US EPA Region 1 Freshwater Acute Toxicity Test Procedure and Protocol*. US EPA Region I Office, Boston, Massachusetts. February 28, 2011.

TABLE 1. Summary of Sample Collection Information.
Warner Village WWTF Effluent Biomonitoring Evaluation. July 2018.

Sample Description	Type	Collection Date	Collection Time	Receipt Date	Receipt Time	Arrival Temp °C
Effluent	Comp	07/24/18	0805	07/25/18	1125	6
Receiving Water	Grab	07/24/18	0830	07/25/18	1125	6

TABLE 2. Summary of Reference Toxicant Data.
Warner Village WWTF Effluent Biomonitoring Evaluation. July 2018.

Date	Endpoint		Value	Historic Mean/ Central Tendency	Acceptable Range	Reference Toxicant
C. dubia						
07/05/18	Survival	LC-50	19.0	23.4	3.8 - 43.0	SDS (mg/L)
P. promelas						
07/05/18	Survival	LC-50	31.3	34.3	24.0 - 44.6	SDS (mg/L)

Means and Acceptable Ranges based on the most recent 20 reference toxicant assays.

TABLE 3. Summary of Acute Evaluation Results.
Warner Village WWTF Effluent Biomonitoring Evaluation. July 2018.

Percent Survival

Species	Exposure	Lab	RW	6.25%	12.5%	25%	50%	100%
C. dubia	48 hours	95%	95%	100%	100%	100%	100%	95%
P. promelas	48 hours	100%	100%	100%	100%	100%	100%	100%

LC-50 and A-NOEC Results

Species	Exposure	Spearman-Karber	Probit	Direct Observation	A-NOEC
C. dubia	48 Hours	NC	NC	>100%	NC
P. promelas	48 Hours	NC	NC	>100%	NC

COMMENTS:
RW = Receiving Water; used as the diluent.
NC = Not Calculated.

TABLE 4. Summary of Effluent and Diluent Characteristics. Warner Village WWTF Effluent Biomonitoring Evaluation. July 2018.

PARAMETER	UNIT	EFFLUENT	RECEIVING WATER
Specific Conductivity	µmhos/cm	676	116
pH	SU	6.90	6.95
Total Residual Chlorine	mg/L	<0.02	-
Alkalinity	mg/L	34 [b]	13 [b]
Hardness	mg/L	88	15
Total Solids	mg/L	470	90
Total Suspended Solids	mg/L	<2 [a]	2.8
Total Dissolved Solids	mg/L	430	84
Ammonia	mg/L	<0.1	<0.1
Total Organic Carbon	mg/L	6.3	4.4
Aluminum, Total	mg/L	0.05	0.02
Cadmium, Total	mg/L	<0.0003	<0.0003
Calcium, Total	mg/L	4.46	20.9
Chromium, Total	mg/L	<0.001	<0.001
Copper, Total	mg/L	0.0012	0.016
Lead, Total	mg/L	0.0003	0.0007
Magnesium, Total	mg/L	0.78	8.33
Nickel, Total	mg/L	0.0012	0.0052
Zinc, Total	mg/L	0.0037	0.066

COMMENTS:
Additional water quality and chemistry support data are provided in Appendix A.
[a] TSS filter residue below or exceeds method requirement. Result may be used with due consideration
[b] Sample over recommended holding time. Result may be unusable for regulatory compliance purposes.

TOXICITY TEST SUMMARY SHEET

FACILITY NAME: Warner Village WWTF TEST START DATE: 07/25/18
NPDES PERMIT NO.: NH0100498 TEST END DATE: 07/27/18

TEST TYPE	TEST SPECIES	SAMPLE TYPE	SAMPLE METHOD
X Acute	___ *Pimephales promelas*	___ Prechlorinated	___ Grab
___ Chronic	X *Ceriodaphnia dubia*	___ Dechlorinated	X Composite
___ Modified Chronic (Reporting Acute Values)	___ *Daphnia pulex*	___ Chlorine Spiked in Lab	___ Flow-thru
	___ *Americamysis bahia*	___ Chlorinated on Site	___ Other
	___ *Cyprinodon variegatus*	___ Unchlorinated	
___ 24 Hour Screen	___ *Menidia beryllina*	X No Detectable Chlorine Upon Receipt	
	___ *Arbacia punctulata*		

DILUTION WATER:

X Receiving water collected at a point upstream or away from the discharge, free from toxicity or other sources of contamination; Receiving Water Name: Warner River

___ Alternate surface water of known quality and hardness, to generally reflect the characteristics of the receiving water; Receiving Water Name: ___

___ Synthetic water prepared using either Millipore Milli-Q or equivalent deionized water and reagent grade chemicals; or deionized water combined with mineral water.

___ Artificial sea salts mixed with deionized water

___ Deionized water and hypersaline brine

___ Other

EFFLUENT SAMPLING DATES: 07/24/18 ___ ___ ___

EFFLUENT CONCENTRATIONS TESTED (%): 6.25%, 12.5%, 25%, 50%, 100%

Permit Limit Concentration: 100% %

Was the effluent salinity adjusted? No If yes, to what level? ___ ppt

REFERENCE TOXICANT TEST DATE: 07/05/18 LC-50: 19.0 mg/L Sodium Dodecyl Sulfate

PERMIT LIMITS AND TEST RESULTS

Test Acceptability Criteria

Mean Diluent Control Survival: 95%

LIMITS		**RESULTS**	
LC-50:	100 %	LC-50	>100 %
		Upper Limit:	- %
A-NOEC:	- %	Lower Limit:	- %
		Method:	Direct Observation
C-NOEC:	- %	A-NOEC	-%
		C-NOEC	- %
IC- ___	- %	IC- ___	- %

TOXICITY TEST SUMMARY SHEET

FACILITY NAME: Warner Village WWTF
NPDES PERMIT NO.: NH0100498
TEST START DATE: 07/25/18
TEST END DATE: 07/27/18

TEST TYPE	TEST SPECIES	SAMPLE TYPE	SAMPLE METHOD
X Acute	X *Pimephales promelas*	___ Prechlorinated	___ Grab
___ Chronic	___ *Ceriodaphnia dubia*	___ Dechlorinated	X Composite
___ Modified Chronic (Reporting Acute Values)	___ *Daphnia pulex*	___ Chlorine Spiked in Lab	___ Flow-thru
	___ *Americamysis bahia*	___ Chlorinated on Site	___ Other
	___ *Cyprinodon variegatus*	___ Unchlorinated	
___ 24 Hour Screen	___ *Menidia beryllina*	X No Detectable Chlorine Upon Receipt	
	___ *Arbacia punctulata*		

DILUTION WATER:

X Receiving water collected at a point upstream or away from the discharge, free from toxicity or other sources of contamination; Receiving Water Name: Warner River

___ Alternate surface water of known quality and hardness, to generally reflect the characteristics of the receiving water; Receiving Water Name: _____

___ Synthetic water prepared using either Millipore Milli-Q or equivalent deionized water and reagent grade chemicals; or deionized water combined with mineral water.

___ Artificial sea salts mixed with deionized water

___ Deionized water and hypersaline brine

___ Other

EFFLUENT SAMPLING DATES: 07/24/18 _____ _____ _____

EFFLUENT CONCENTRATIONS TESTED (%): 6.25%, 12.5%, 25%, 50%, 100%

Permit Limit Concentration: 100 %

Was the effluent salinity adjusted? NO If yes, to what level? _____ ppt

REFERENCE TOXICANT TEST DATE: 07/05/18 LC-50: 31.3 mg/L Sodium Dodecyl Sulfate

PERMIT LIMITS AND TEST RESULTS

Test Acceptability Criteria

Mean Diluent Control Survival: 100%

LIMITS		**RESULTS**	
LC-50:	100 %	LC-50	>100 %
		Upper Limit:	- %
A-NOEC:	- %	Lower Limit:	- %
		Method:	Direct Observation
C-NOEC:	- %	A-NOEC	- %
		C-NOEC	- %
IC- ___	- %	IC- ___	- %

APPENDIX A

RAW DATA

STATISTICAL SUPPORT

METHODS USED IN NPDES PERMIT BIOMONITORING TESTING

Parameter	Method
Acute Exposure Bioassays:	
Ceriodaphnia dubia	EPA-821-R-02-012 2002.0
Daphnia pulex	EPA-821-R-02-012 2021.0
Pimephales promelas	EPA-821-R-02-012 2000.0
Americamysis bahia	EPA-821-R-02-012 2007.0
Menidia beryllina	EPA-821-R-02-012 2006.0
Cyprinodon variegatus	EPA-821-R-02-012 2004.0
Chronic Exposure Bioassays:	
Ceriodaphnia dubia	EPA-821-R-02-013 1002.0
Pimephales promelas	EPA-821-R-02-013 1000.0
Cyprinodon variegatus	EPA-821-R-02-014 1004.0
Menidia beryllina	EPA-821-R-02-014 1006.0
Arbacia punctulata	EPA-821-R-02-014 1008.0
Champia parvula	EPA-821-R-02-014 1009.0
Trace Metals:	
Trace Metals	EPA 200.8/SW 6020, EPA 245.7
Hardness	EPA SW846 3rd Ed. 6010
Wet Chemistries:	
Alkalinity	EPA 310.2
Chlorine, Residual	Standard Methods 22nd Edition - Method 4500-Cl D
Total Organic Carbon	Standard Methods 22nd Edition - Method 5310 C
Specific Conductance	Standard Methods 22nd Edition - Method 2510 B
Nitrogen - Ammonia	Standard Methods 22nd Edition - Method 4500-NH_3G
pH	Standard Methods 22nd Edition - Method 4500-H+ B
Solids, Total (TS)	Standard Methods 22nd Edition - Method 2540 B
Solids, Total Dissolved (TDS)	Standard Methods 22nd Edition - Method 2540 C
Solids, Total Suspended (TSS)	Standard Methods 22nd Edition - Method 2540 D
Dissolved Oxygen	Standard Methods 22nd Edition - Method 4500-O G

Please visit our web site at www.envirosystems.com for a copy of our accreditations and state certifications.

DAPHNID ACUTE DEFINITIVE ASSAY

STUDY: 30901	CLIENT: Warner Village Water District	SAMPLE: Effluent	DILUENT: RW
SPECIES: *C. dubia*	SOURCE: OOCDES1072518		AGE: <24 Hours

CONC	REP	SURVIVAL 0	SURVIVAL 24	SURVIVAL 48	DO (mg/L) 0	DO (mg/L) 24	DO (mg/L) 48	pH (SU) 0	pH (SU) 24	pH (SU) 48	S/C (µmhos/cm) 0	SAMPLE CHEMISTRIES
MSR	Surr.	5	5	5	8.5	8.8	8.3	7.57	8.04	7.97	212	See *P. promelas* Sheet for Chemistry Information.
	A	5	5	5								
	B	5	5	5								
	C	5	5	5								
	D	5	5	4								
RW	Surr.	5	5	5	~~8.5~~ 9.0	8.8	8.3	6.95	7.73	7.80	116	
	A	5	5	5								
	B	5	5	4								
	C	5	5	5								
	D	5	5	5								
6.25%	Surr.	5	5	5	8.7	8.8	8.3	6.81	7.74	7.75	152	Batch Used *Selenastrum:* A-518G YCT: F132
	A	5	5	5								
	B	5	5	5								
	C	5	5	5								
	D	5	5	5								
12.5%	Surr.	5	5	5	8.7	8.8	8.4	6.78	7.75	7.78	182	
	A	5	5	5								
	B	5	5	5								
	C	5	5	5								
	D	5	5	5								
25%	Surr.	5	5	5	8.7	8.9	8.4	6.82	7.78	7.79	253	
	A	5	5	5								
	B	5	5	5								
	C	5	5	5								
	D	5	5	5								
50%	Surr.	5	5	5	8.8	8.9	8.4	6.88	7.80	7.82	367	
	A	5	5	5								
	B	5	5	5								
	C	5	5	5								
	D	5	5	5								
100%	Surr.	5	5	5	9.0	8.8	8.5	6.90	7.87	7.91	676	
	A	5	5	4								
	B	5	5	5								
	C	5	5	5								
	D	5	5	5								
INC TEMP (°C)		26	26	26								
DATE		7/25/18	07/26/18	7/27/18	7/25/18	07/26/18	7/27/18					
TIME		1555	1445	1420	1315	1105	1230					
INITIALS		MW	GRS	MW	MW	MS	MW					

ACUTE BIOASSAY DATA SUMMARY

STUDY: 30901	Brine Shrimp: A- 4729
CLIENT: Warner Village Water District	TEST ORGANISM: *P. promelas*
SAMPLE: Effluent	ORGANISM SUPPLIER/BATCH/AGE: *See Organism Culture Sheet*
DILUENT: Receiving Water (RW)	

"AS RECEIVED" EFFLUENT AND DILUENT CHEMISTRIES

	METALS	TOC	ALK	HAR	AMM	Solids	TRC
Effluent	001/002	043	004	005	006	007/008	<0.02
Diluent	011	012	013	014	015	016/017	

CONC	REP	SURVIVAL 0	SURVIVAL 24	SURVIVAL 48	DISSOLVED OXYGEN (mg/L) 0	DISSOLVED OXYGEN (mg/L) 24	DISSOLVED OXYGEN (mg/L) 48	pH (SU) 0	pH (SU) 24	pH (SU) 48	TEMPERATURE (°C) 0	TEMPERATURE (°C) 24	TEMPERATURE (°C) 48	S/C (µmhos/cm) 0
MSR	A	10	10	10	8.5	7.7	7.9	7.57	7.64	7.59	24	23	24	212
	B	10	10	10	8.5	7.6	7.8							
RW	A	10	10	10	9.0	7.4	7.8	6.95	7.23	7.37	26	(E10) MW 7/27/18	24	116
	B	10	10	10	9.0	7.5	7.7							
6.25%	A	10	10	10	8.7	7.5	7.7	6.81	7.17	7.21	26	7/27/18	24	152
	B	10	10	10	8.7	7.5	7.8							
12.5%	A	10	10	10	8.7	7.4	7.6	6.78	7.24	7.23	26		23	182
	B	10	10	10	8.7	7.4	7.6							
25%	A	10	10	10	8.7	7.3	7.6	6.82	7.24	7.26	26		23	253
	B	10	10	10	8.7	7.6	7.7							
50%	A	10	10	10	8.8	7.6	7.7	6.88	7.37	7.39	26		23	367
	B	10	10	10	8.8	7.7	7.5							
100%	A	10	10	10	9.0	7.7	7.5	6.90	7.43	7.48	26		24	676
	B	10	10	10	9.0	7.7	7.3							
INC TEMP (°C)		26	26	26										
DATE		07/25/18	07/26/18	7/27/18	7/25/18	07/26/18	7/27/18							
TIME		1355 (5) CFS 07/25	1430	1430	1315	1100	1220							
INITIALS		CFS	GRS	MW	MW	MS	MW							

(E10) MW 7/27/18 temperature values overlooked on "A" reps.

Data Approved by QA

STUDY: 30901
CLIENT: WARNER
PROJECT: WARNER
ASSAY: PP48AD
SPECIES: *P. promelas*

BALANCE: Ohaus Discovery Balance Model DV215CD
Serial #: 1124024313

Date / Intials:	07/25/18 LAG LAG
Rep	
1	0.00257
2	0.00674
3	0.00135
4	0.005
5	0.00322
6	0.00239
7	0.00256
8	0.00312
9	0.00379
10	0.00199
11	0.00211
12	0.00144
13	0.00244
14	0.00189
15	0.00184
16	0.00372
17	0.00169
18	0.00185
19	0.00201
20	0.00194
Mean Weight (g):	0.00268
Test Volume (L):	0.2
Loading Rate(g/L):	0.13415

Aquatic Research Organisms 09PpAR0072518

DATA SHEET

I. Organism History

Species Pimephales promelas

Source: Lab reared X Hatchery reared _____ Field collected _____

Hatch date 7/16/18 Receipt date _____

Lot number 07 12 18 FH Strain ARO

Brood origination EPA OH

II. Water Quality

Temperature 24 °C Salinity – ppt. D.O. SAT ppm

pH 7.4 su Hardness ≈120 ppm Alkalinity ≈140 ppm

III. Culture Conditions

Freshwater X Saltwater _____ Other _____

Recirculating X Flow through _____ Static renewal \

DIET: Flake food X Phytoplankton _____ Trout chow _____

Artemia X Rotifers X YCT _____ Other Emp Diet

Prophylactic treatments: _____

Comments: _____

_____

IV. Shipping Information

Client: ESI # of Organisms 700+

Carrier: Pick-up Date shipped 7/16/18

Biologist: _____

PO BOX 1271 HAMPTON NH 03843-1271 (603) 926-1650 AROFISH@AOL.COM

PREPARATION OF DILUTIONS

STUDY: 30901	CLIENT: Warner Village Water District	
SPECIES: *C. dubia & P. promelas*		
Diluent: Receiving Water	Day: 0 Start E_0=26.3°C D_0=26.4°C Sample: E_0, D_0	
Concentration %	Vol. Eff.(mls)	Final Vol.(mls)
MSR	0	500
RW	0	↓
6.25%	31.25	
12.5%	62.5	
25%	125	
50%	250	
100%	500	
INITIALS:	MW	
TIME:	1255	
DATE:	7/25/18	

RECORD OF METERS USED

STUDY: 30901		CLIENT: Warner Village Water District	
C. dubia			
Exposure (Hours)			
	0	24	48
Water Quality Station #	2	1	2
Initials / Date	MW 7/25/18	MS 07/26/18	MW 7/27/18
P. promelas			
Exposure (Hours)			
	0	24	48
Water Quality Station #	2	1	2
Initials / Date	MW 7/25/18	MS 07/26/18	MW 7/27/18

Water Quality Station #1		Water Quality Station #2		COMMENTS
DO meter #	ML02	DO meter #	ML01	
DO probe #	160	DO probe #	96	
pH meter #	ML02	pH meter #	ML01	
pH probe #	163	pH probe #	158	
S/C meter #	ML02	S/C meter #	ML01	
S/C probe #	1	S/C probe #	159	
Salinity meter #	ML02	Salinity meter #	ML01	

Report No: 30901 SDG:
Project: Warner Village

Sample ID: Effluent Start
Matrix: Water
Sampled: 07/24/18 0804

Parameter		Result	Qualifiers	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Total solids	30901-008	470		10	mg/L	07/27/18 1345	07/31/18 1010	CA /SM 2540B
Total suspended solids	30901-007	ND	J26	2	mg/L	07/27/18 1510	07/30/18 1105	CA /SM 2540D
Total dissolved solids	30901-008	430		5	mg/L	07/30/18 1520	08/03/18 1255	CA /SM 2540C
Alkalinity as CaCO3	30901-004	34	R1	2	mg/L	08/13/18 1130	08/13/18 1130	JHW/EPA 310.2
Total organic carbon	30901-003	6.3		0.4	mg/L	07/26/18	07/26/18	JHW/SM 5310 C
Ammonia-N	30901-006	ND		0.1	mg/L as N	07/31/18 1230	07/31/18 1230	JHW/SM 4500-NH3 G
Total phosphorus	30901-009	5.4		0.2	mg/L	08/09/18 1230	08/10/18 1050	CA /SM 4500-P E
Hardness as CaCO3	30901-005	88		0.3	mg/L	08/02/18 1000	08/02/18 1145	JLH/ess/SW846 3rd Ed. 6020
Aluminum, total	30901-002	0.05		0.02	mg/L	07/27/18 1030	07/30/18 1704	EG /EPA 200.8
Cadmium, total	30901-002	ND		0.0003	mg/L	07/27/18 1030	07/30/18 1704	EG /EPA 200.8
Calcium, total	30901-002	4.46		0.05	mg/L	07/27/18 1030	07/30/18 1704	EG /EPA 200.8
Chromium, total	30901-002	ND		0.001	mg/L	07/27/18 1030	07/30/18 1704	EG /EPA 200.8
Copper, total	30901-002	0.0012		0.0005	mg/L	07/27/18 1030	07/30/18 1704	EG /EPA 200.8
Lead, total	30901-002	0.0003		0.0003	mg/L	07/27/18 1030	07/30/18 1704	EG /EPA 200.8
Magnesium, total	30901-002	0.78		0.05	mg/L	07/27/18 1030	07/30/18 1704	EG /EPA 200.8
Nickel, total	30901-002	0.0012		0.001	mg/L	07/27/18 1030	07/30/18 1704	EG /EPA 200.8
Zinc, total	30901-002	0.0037		0.002	mg/L	07/27/18 1030	07/30/18 1704	EG /EPA 200.8

Sample ID: Receiving Water Start
Matrix: Water
Sampled: 07/24/18 0830

Parameter		Result	Qualifiers	Quant Limit	Units	Date Prepared	Date of Analysis	INIT/Method/Reference
Total solids	30901-017	90		10	mg/L	07/27/18 1345	07/31/18 1010	CA /SM 2540B
Total suspended solids	30901-016	2.8		1	mg/L	07/27/18 1510	07/30/18 1105	CA /SM 2540D
Total dissolved solids	30901-017	84		5	mg/L	07/30/18 1520	08/03/18 1255	CA /SM 2540C
Alkalinity as CaCO3	30901-013	13	R1	2	mg/L	08/13/18 1130	08/13/18 1130	JHW/EPA 310.2
Total organic carbon	30901-012	4.4		0.4	mg/L	07/26/18	07/26/18	JHW/SM 5310 C
Ammonia-N	30901-015	ND		0.1	mg/L as N	07/31/18 1230	07/31/18 1230	JHW/SM 4500-NH3 G
Hardness as CaCO3	30901-014	15		0.3	mg/L	08/02/18 1000	08/02/18 1147	JLH/ess/SW846 3rd Ed. 6020
Aluminum, total	30901-011	0.02		0.02	mg/L	07/27/18 1030	07/30/18 1711	EG /EPA 200.8
Cadmium, total	30901-011	ND		0.0003	mg/L	07/27/18 1030	07/30/18 1711	EG /EPA 200.8
Calcium, total	30901-011	20.9		0.05	mg/L	07/27/18 1030	07/30/18 1711	EG /EPA 200.8
Chromium, total	30901-011	ND		0.001	mg/L	07/27/18 1030	07/30/18 1711	EG /EPA 200.8
Copper, total	30901-011	0.016		0.0005	mg/L	07/27/18 1030	07/30/18 1711	EG /EPA 200.8
Lead, total	30901-011	0.0007		0.0003	mg/L	07/27/18 1030	07/30/18 1711	EG /EPA 200.8
Magnesium, total	30901-011	8.33		0.05	mg/L	07/27/18 1030	07/30/18 1711	EG /EPA 200.8
Nickel, total	30901-011	0.0052		0.001	mg/L	07/27/18 1030	07/30/18 1711	EG /EPA 200.8
Zinc, total	30901-011	0.066		0.002	mg/L	07/27/18 1030	07/30/18 1711	EG /EPA 200.8

Notes:

J26 = TSS filter residue below or exceeds method requirement. Result may be used with due consideration.
R1= Sample over recommended holding time. Result may be unusable for regulatory compliance purposes.

SAMPLE RECEIPT AND CONDITION DOCUMENTATION

STUDY NO:	30901		
SDG No:			
Project:	Warner Village		
Delivered via:	ESI		
Date and Time Received:	07/25/18 1125	Date and TIme Logged into Lab:	07/25/18 1205
Received By:	MW	Logged into Lab by:	MW MW
Air bill / Way bill:	No	Air bill included in folder if received?	NA
Cooler on ice/packs:	Yes	Custody Seals present?	NA
Cooler Blank Temp (C) at arrival:	5.8	Custody Seals intact?	NA
Number of COC Pages:	2		
COC Serial Number(s):	A1016472		
COC Complete:	Yes	Does the info on the COC match the samples?	Yes
Sampled Date:	Yes	Were samples received within holding time?	Yes
Field ID complete:	Yes	Were all samples properly labeled?	Yes
Sampled Time:	Yes	Were proper sample containers used?	Yes
Analysis request:	Yes	Were samples received intact? (none broken or leaking)	Yes
COC Signed and dated:	Yes	Were sample volumes sufficient for requested analysis?	Yes
Were all samples received?	Yes	Were VOC vials free of headspace?	NA
Client notification/authorization:	Not required	pH Test strip ID number:	A-5084

Field ID	Lab ID	Mx	Analysis Requested	Bottle	Req'd Pres'n	Verified Pres'n
Effluent Start	30901-001	W	CDPP48 StartSample	1x3750 P	4 C	Yes
Effluent Start	30901-002	W	Total Metals Cd,Cr,Ni,Pb,Cu,Zn,Al,Ca,Mg;	250 P	HNO3	Yes
Effluent Start	30901-003	W	TOC	1x40 G	H2SO4	Yes
Effluent Start	30901-004	W	Alk	125 P	4 C	Yes
Effluent Start	30901-005	W	Metals Hard;	125 P	HNO3	Yes
Effluent Start	30901-006	W	NH3;	125 P	H2SO4	Yes
Effluent Start	30901-007	W	TSS	1000 P	4 C	Yes
Effluent Start	30901-008	W	TS,TDS	500 P	4 C	Yes
Effluent Start	30901-009	W	TP	250mL	H2SO4	Yes
Receiving Water Start	30901-010	W	CDPP48AD StartDiluent	2x3750 P	4 C	Yes
Receiving Water Start	30901-011	W	Total Metals Cd,Cr,Ni,Pb,Cu,Zn,Al,Ca,Mg;	250 P	HNO3	Yes
Receiving Water Start	30901-012	W	TOC	1x40 G	H2SO4	Yes
Receiving Water Start	30901-013	W	Alk	125 P	4 C	Yes
Receiving Water Start	30901-014	W	Metals Hard;	125 P	HNO3	Yes
Receiving Water Start	30901-015	W	NH3;	125 P	H2SO4	Yes
Receiving Water Start	30901-016	W	TSS	1000 P	4 C	Yes
Receiving Water Start	30901-017	W	TS,TDS	500 P	4 C	Yes

Notes and qualifications:

See COC

ESI EnviroSystems, Inc.
1 Lafayette Road
Hampton, NH 03842

Voice: 603-926-3345
FAX: 603-926-3521

ESI Job No: 30901

CHAIN OF CUSTODY DOCUMENTATION

Client: Warner Village Water District	Contact: Chuck Come	Project Name: Warner	
Report to: Chuck Come	Address: 15 West Joppa Road P.O. Box 252	Project Number: P0107	Task: 0001
Invoice to: Chuck Come	Address: Warner, NH 03278	Project Manager: Chuck Come	
Voice: 603-456-1891	Fax: 0	email:	P.O.No: ' Quote No:40382-A

Protocol: NPDES

Lab Number (assigned by lab)	Your Field ID: (must agree with container)	Date Sampled	Time Sampled	Sampled By	Grab or composite (G/C)	Container No	Container Size (mL)	Container Type (P/G/T)	Field Preservation	Matrix S=Solid W=Water	Filter N=Not needed F=Done in field L=Lab to do	Analyses Requested\ Special Instructions:
001	Effluent Start	7-24-18	8:05	Stan		1	3750	P	4 C	Water	N	CDPP48 StartSample
002	Effluent Start	7-24-18	8:05	Stan		1	250	P	HNO3	Water	N	Total Metals Cd,Cr,Ni,Pb,Cu,Zn,Al,Ca,Mg;
003	Effluent Start	7-24-18	8:05	Stan		1	40	G	H2SO4	Water	N	TOC
004	Effluent Start	7-24-18	8:05	Stan		1	125	P	4 C	Water	N	Alk
005	Effluent Start	7-24-18	8:05	Stan		1	125	P	HNO3	Water	N	Metals Hard;
006	Effluent Start	7-24-18	8:05	Stan		1	125	P	H2SO4	Water	N	NH3;
007	Effluent Start	7-24-18	8:05	Stan		1	1000	P	4 C	Water	N	TSS
008	Effluent Start	7-24-18	8:05	Stan		1	500	P	4 C	Water	N	TS,TDS
009	Effluent Start	7-24-18	8:05	Stan		1	250m	mL	H2SO4	Water	N	TP

Relinquished By: Stanley Hagmann	Date: 7-25-18 Time: 9:47	Received By: RScott	Date: 7/25/18 Time: 947
Relinquished By: RScott	Date: 7/25/18 Time: 1125	Received at Lab By: Meredith Wurtz	Date: 7/25/18 Time: 1125

Comments:

ERR

8C

COC Number: A1016472

Sample Delivery Group No: June 2018	Page of

ESI EnviroSystems, Inc.
1 Lafayette Road
Hampton, NH 03842

Voice: 603-926-3345
FAX: 603-926-3521

ESI Job No: 30901

CHAIN OF CUSTODY DOCUMENTATION

Client: Warner Village Water District	Contact: Chuck Come	Project Name: Warner	
Report to: Chuck Come	Address: 15 West Joppa Road P.O. Box 252	Project Number: P0107	Task: 0001
Invoice to: Chuck Come	Address: Warner, NH 03278	Project Manager: Chuck Come	
Voice: 603-456-1891	Fax: 0	email:	P.O.No: ' Quote No:40382-A

Protocol: NPDES

Lab Number (assigned by lab)	Your Field ID: (must agree with container)	Date Sampled	Time Sampled	Sampled By	Grab or com-posite (G/C)	Container No	Container Size (mL)	Container Type (P/G/T)	Field Preser-vation	Matrix S=Solid W=Water	Filter N=Not needed F=Done in field L=Lab to do	Analyses Requested\ Special Instructions:
010	Receiving Water Start	7-24-18	8:30	STAN		2	3750	P	4 C	Water	N	CDPP48AD StartDiluent
011	Receiving Water Start	7-24-18	8:30	STAN		1	250	P	HNO3	Water	N	Total Metals Cd,Cr,Ni,Pb,Cu,Zn,Al,Ca,Mg;
012	Receiving Water Start	7-24-18	8:30	STAN		1	40	G	H2SO4	Water	N	TOC
013	Receiving Water Start	7-24-18	8:30	STAN		1	125	P	4 C	Water	N	Alk
014	Receiving Water Start	7-24-18	8:30	STAN		1	125	P	HNO3	Water	N	Metals Hard;
015	Receiving Water Start	7-24-18	8:30	STAN		1	125	P	H2SO4	Water	N	NH3;
016	Receiving Water Start	7-24-18	8:30	STAN		1	1000	P	4 C	Water	N	TSS
017	Receiving Water Start	7-24-18	8:30	STAN		1	500	P	4 C	Water	N	TS,TDS

Relinquished By: Stanley Hamman	Date: 7-25-18 Time: 9:47	Received By: R Swett	Date: 7/25/18 Time: 947
Relinquished By: R Swett	Date: 7/25/18 Time: 1125	Received at Lab By: Miranda Wilson	Date: 7/25/18 Time: 1125

Comments:

ERR

COC Number: A1016472

Sample Delivery Group No: June 2018

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Assay Review Checklist

DATE IN: 07/25/18
DATE DUE: 8/15/18

STUDY#: 30901
CLIENT: Warner Village Water District ~~Kt~~ @ BCFS 07/25
PROJECT:
ASSAY: Cd Pp ~~7DCR~~ 48AD @ BG 07/28

Project Paperwork Check for Completeness			
	Date	**Initials**	**Comments**
Day 0	7/25/18	MW	
Day 1	07/26/18	GRS	Daphid acute WQ not filled in
Day 2	7/27/18	MW	
Day 3			
Day 4			
Day 5			
Day 6			
Day 7			
Day 8			

Analyst Data Review	**Date**	**Initials**	**Comments**
Chains of Custody Complete	07/28/18	BG	
Sample Receipt Complete	↓	↓	
Organism Culture Sheet(s)	↓	↓	
Bench Sheets Complete (dates, times, initials, etc...)	↓	↓	
Water Quality Data Complete	↓	↓	
TRC Values & Bottle Numbers	↓	↓	
Daphnid Calculations Complete	↓	NA	
Weights Reported	↓	BG	
Assay Acceptability Review	↓	↓	

Technical Report Review	**Date**	**Initials**	**Comments**
Statistical Analysis Complete	N/A		
Statistical Analysis Reviewed	↓		
Data Acceptability Review	8/17/18	LF	
Supporting Chemistry Report	8/27/18	LF	
Draft Report	8/17/18	LF	
QA Audit/Review Complete			
Final Report Reviewed	8/24/18	CJ	
Final Report Printed - PDF	8/29/18	LF	
Executive Summary / Chems Sent			
Report E-mailed / Faxed	8/29/18	LF	
Report Logged Out / Invoice Sent	↓	↓	
Report Scanned to Archive	↓	↓	

P:\GENERAL PROJECTS\FORMS\LABFORMS\$ Assay Review Checklist.wpd